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Abstract

RECENT PROGRESS IN FISSION PRODUCT SEPARATION

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I - Separation of caesium 137

Successful experiments have been done on the method described at Geneva in 1958.

The process has been considerably improved :

1° - Initially, the caesium phosphotungstate precipitate was leached barium hydroxide in the centrifuge and this was followed by a distillation of ammonia in a concentrator. The barium hydroxide was then eliminated by carbonate precipitation and centrifugation.

It has been proved that the ammonia distillation could be replaced by its evaporation during centrifugation, thus eliminating the need of a concentrator.

It was then possible to carry out the carbonation on the solide-liquid mixture produced by the baryta water leaching.

2° - In applying the above process to the treatment of solutions derived from uranium molybdenum fuels, concentrating is to be recommended in order to hold the molybdenum in solution by complexing it with phosphoric acid.

This complexing process provides a suspension of zirconium phosphate and ammonium phosphotungstate. These are separated by passing into a basic medium which precipitates the zirconium oxide, then turning back to an acid medium ; the end of the treatment remains unchanged.

3° - Studies carried out in several countries on the exchange properties of hetero-polyacid salts have always met with difficulties as a result of the poor

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mechanical properties of these substances. This difficulty has been overcome by wrapping the ammonium phosphotungstate in a zirconium phosphate matrix.

The exchanger obtained possesses :

- satisfactory mechanical properties,
- a capacity of 0.1 milliequivalent per gram in concentrated nitric acid solution.

It can be eluted and regenerated by a solution of an ammonium salt.

II - Separation of strontium 90 and rare earths.

The procedure for recovery of these various fission products is briefly the following :

- extraction of rare earths by di-2-ethyl hexyl phosphoric acid into dodecane at pH 2, the chemical impurities being complexed by citric acid.
- extraction of most of the magnesium at pH 4 by the same solvent, the solvent being satured with magnesium in order to avoid as far as possible the extraction of strontium.
- extraction of strontium at pH 4.